FIG. **2** is a top plan view of the slurry distributor of FIG. **1**.

FIGS. **3** and **4** are, respectively, right and left elevational views of the slurry distributor of FIG. **1**.

FIG. **5** is a top plan view, in section, of another embodiment of a slurry distributor in accordance with the disclosure.

FIGS. **6-8** are fragmentary, front elevational views of an outlet opening suitable for use with a slurry distributor in accordance with the disclosure, illustrating various outlet opening shapes.

FIG. **9** is a fragmentary, front elevational view of a slurry distributor in accordance with the disclosure, illustrating an embodiment of a profiling system mounted to an outlet opening.

DETAILED DESCRIPTION

The disclosure relates to a distribution system for distributing an aqueous gypsum onto an advancing web (e.g., paper or mat) moving on a conveyor during a continuous manufacturing process, such as a wallboard manufacturing process. A slurry distribution system of the present disclosure is aimed at accomplishing wider spreading for slurries at present WSR or slurries having relatively low WSR and, therefore, relatively higher viscosity. In general, the disclosed system and method is suitable for slurries having relatively high viscosity due to low WSR or to special formulations. The spreading is controlled by routing and distributing the slurry using a distribution system as shown and described hereinafter. In the description that follows, features and structures shown and described relative to one embodiment and that are the same or similar to corresponding features and structures of alternate embodiments are denoted by the same reference numerals for simplicity.

Embodiments of a slurry distributor constructed in accordance with principles of the present disclosure can advantageously be configured as a retrofit in an existing wallboard manufacturing system to help allow the system to make wallboard using slurries having a typical WSR to a lower WSR. The slurry distributor can be used with components from a conventional discharge conduit, such as in the form of a gate-canister-boot arrangement as known in the art, or an arrangement as described in U.S. Pat. Nos. 6,494,609; 6,874,930; 7,007,914; and/or 7,296,919. For example, the slurry distributor **100** can replace a conventional single or multiple-branch boot or may, alternatively, be attached to one or more mixer outlet conduits.

FIG. **1** is a perspective view of one embodiment of a gypsum slurry mixing and dispensing assembly **50** including a gypsum slurry mixer **304** and a slurry distributor **100**. The slurry distributor **100** is of the type that can comprise a part of, or act as, a discharge conduit **302** of a conventional gypsum slurry mixer **304** (e.g., a pin mixer) as is known in the art that provides a continuous flow of aqueous calcined gypsum slurry from the mixer **304**.

The gypsum slurry mixer **304** is adapted to agitate water and calcined gypsum to form the aqueous calcined gypsum slurry. It is contemplated that any suitable mixer can be used with the slurry distributor **100**. In various embodiments, the mixer **304** can be located above, alongside, or at a distance from the forming table/conveyor comprising the manufacturing line.

The slurry distributor **100** is in fluid communication with the gypsum slurry mixer **304** and is adapted to receive a flow of aqueous gypsum slurry from the gypsum slurry mixer **304** and distribute the flow of aqueous gypsum slurry onto an advancing web **306**. In the illustrated embodiment, a delivery conduit **303** is disposed between and in fluid communication with the gypsum slurry mixer **304** and the slurry distributor **100**.

The slurry distributor **100** can be connected downstream of one or more flow-modifying elements **308** associated with the delivery conduit **303** to control a flow of the aqueous gypsum slurry. Examples of suitable flow-modifying elements include volume restrictors, pressure reducers, constrictor valves, canisters, etc., including those described in U.S. Pat. Nos. 6,494,609; 6,874,930; 7,007,914; and 7,296,919, for example.

An aqueous foam supply conduit **312** can be in fluid communication with at least one of the gypsum slurry mixer **304** and the delivery conduit **303**. An aqueous foam from a source **310** can be added to the constituent materials through the foam conduit **312** at any suitable location downstream of the mixer **304** and/or in the mixer **304** itself to form a foamed gypsum slurry **314** that is provided to the slurry distributor **100**.

When the foamed gypsum slurry sets and is dried, the foam dispersed in the slurry produces air voids therein which act to lower the overall density of the wallboard. The amount of foam and/or amount of air in the foam can be varied to adjust the dry board density such that the resulting wallboard product is within a desired weight range.

Any suitable foaming agent can be used. Preferably, the aqueous foam is produced in a continuous manner in which a stream of the mix of foaming agent and water is directed to a foam generator, and a stream of the resultant aqueous foam leaves the generator and is directed to and mixed with the calcined gypsum slurry. Some examples of suitable foaming agents are described in U.S. Pat. Nos. 5,683,635 and 5,643,510, for example.

As one of ordinary skill in the art will appreciate, one or both of the webs of cover sheet material can be pre-treated with a very thin relatively denser layer of gypsum slurry (relative to the gypsum slurry comprising the core), often referred to as a skim coat in the art, over the field of the web and/or at least one denser stream of gypsum slurry at the edges of the web to produce hard edges, if desired. To that end, the mixer **304** can include a first auxiliary conduit that is adapted to deposit a stream of dense aqueous calcined gypsum slurry that is relatively denser (i.e., a "face skim coat/hard edge stream") than the stream of aqueous calcined gypsum slurry delivered to the slurry distributor **100**. The first auxiliary conduit can deposit the face skim coat/hard edge stream upon the advancing web **306** of cover sheet material upstream of a skim coat roller (itself upstream of the slurry distributor **100**) that is adapted to apply a skim coat layer to the advancing web **306** of cover sheet material and to define hard edges at the periphery of the moving web **306** by virtue of the width of the roller being less than the width of the moving web as is known in the art. Hard edges can be formed from the same dense slurry that forms the thin dense layer by directing portions of the dense slurry around the ends of the roller used to apply the dense layer to the web **306**.

The mixer **304** can also include a second auxiliary conduit adapted to deposit a stream of dense aqueous calcined gypsum slurry that is relatively denser (i.e., a "back skim coat stream") than the stream of aqueous calcined gypsum slurry delivered to the slurry distributor **100**. The second auxiliary conduit can deposit the back skim coat stream upon a second moving web of cover sheet material upstream (in the direction of movement of the second web) of a skim coat roller that is adapted to apply a skim coat layer to the